

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2018/2019

TSN2201/TCE2321 – COMPUTER NETWORKS

(All sections / Groups)

31 MAY 2019
9.00 a.m - 11.00 a.m
(2 Hours)

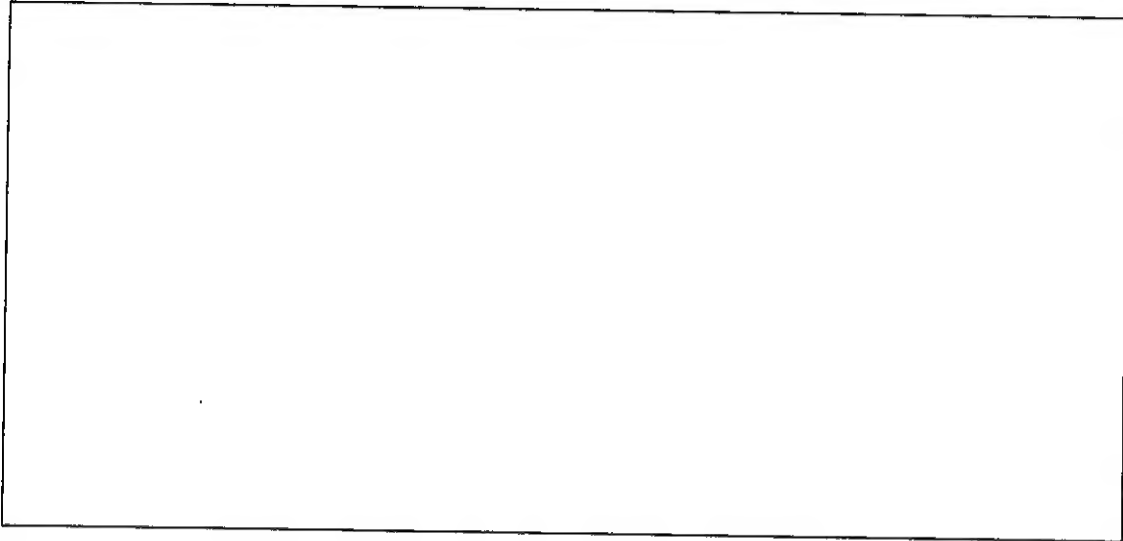
INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **FOURTEEN** pages (**excluding this page**) with **FIVE** questions.
2. Answer all **FIVE** questions. Each question carries **10 marks** and the distribution of the marks for each subdivision is given. Maximum allotted are **50 marks**.
3. Please write all your answers in the Question Paper itself.

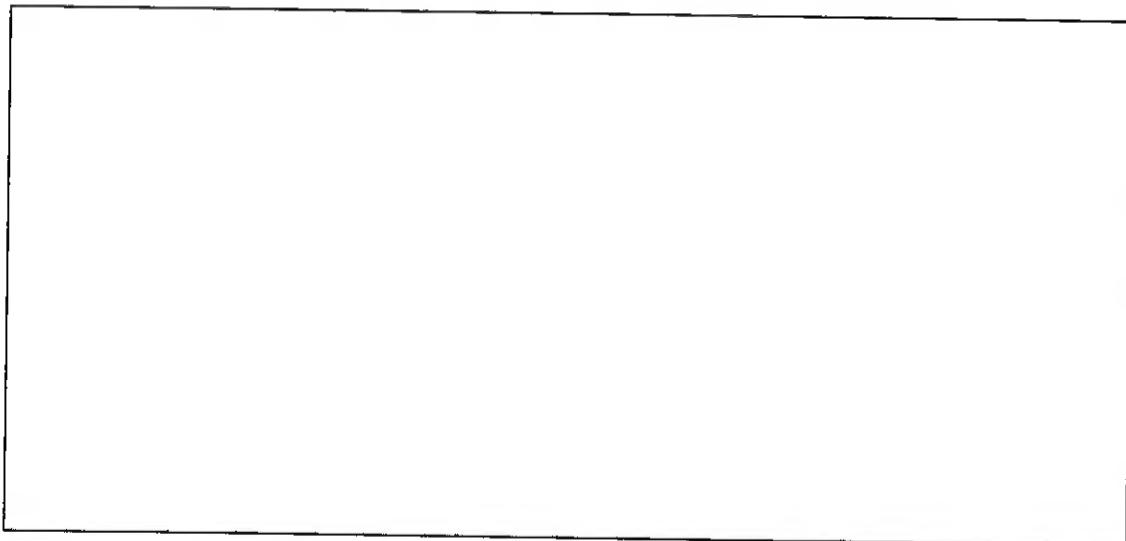
Answer all **FIVE** questions. Each question carries 10 marks and the distribution of the marks for each subdivision is given.
(5 × 10 = 50 marks)

QUESTION 1:

- a. State the major difference between **half-duplex** and **full-duplex** transmission modes. (1 mark)

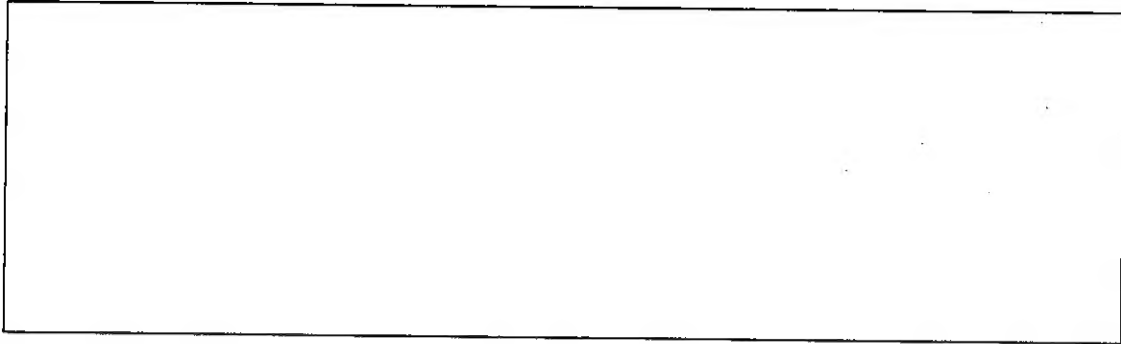


- b. Assume that there are **six** devices in a network. Identify the number of cable links required for (i) **mesh topology** and (ii) **ring topology**. (2 marks)



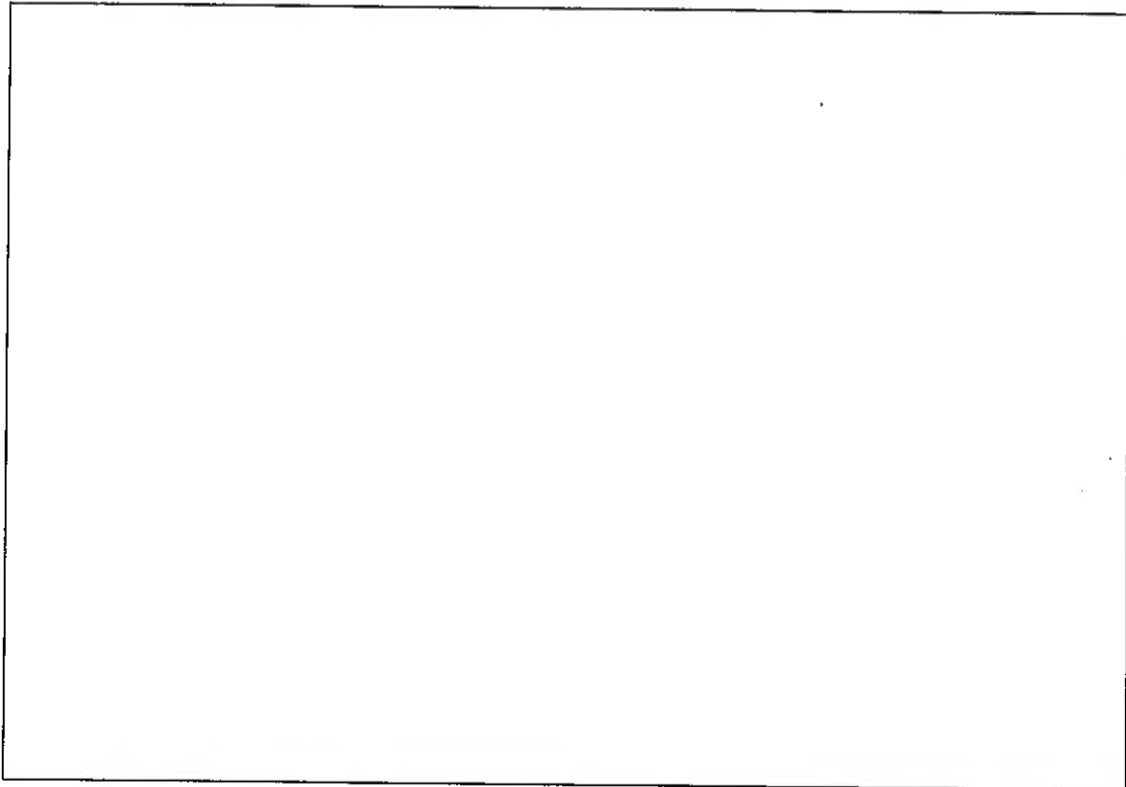
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- c. The TCP/IP protocol suite is used for a host to communicate with another host. Name the **unit of data** sent or received at (i) **network layer** (ii) **data-link layer**.
(1mark)



- d. Bit rate is used to describe digital signal, which is the number of bits sent in 1 second.
- (i) Calculate the **bit rate (in Kbps)** for a signal that sends 10 bits in 10 microseconds.
- (ii) Calculate the **time taken (in milli-seconds)** to send out 2 bytes, if a device is sending out data at the rate of 100 bits per second.

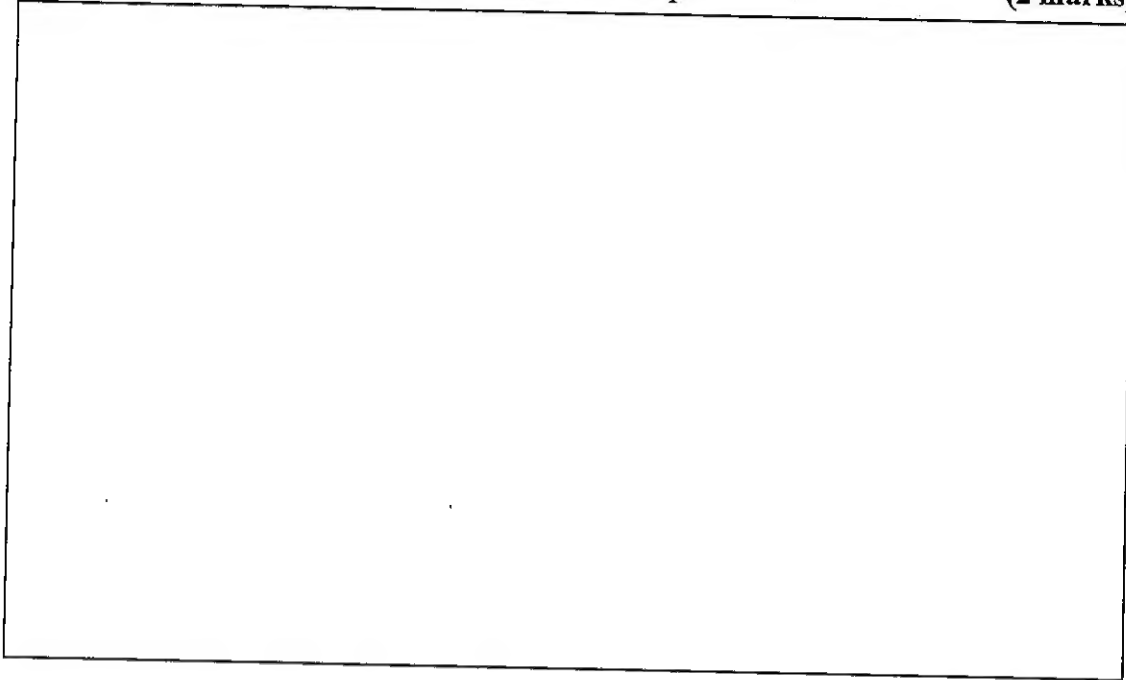
(2 marks)



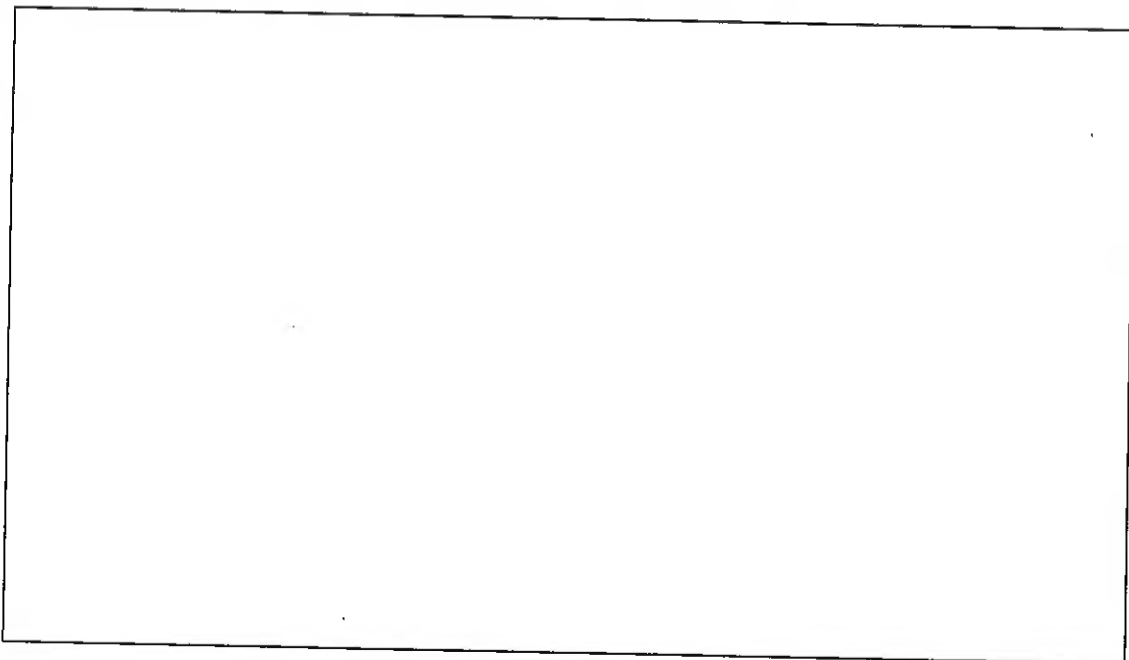
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- e. Bit length is the distance one bit occupies on the transmission medium, which can be calculated as the product of propagation speed and bit duration. Bit duration is the inverse of the bandwidth.

Calculate the **bit duration** and **length of a bit** in a channel with a propagation speed of 2×10^8 m/s, if the channel bandwidth is 1 Gbps. (2 marks)



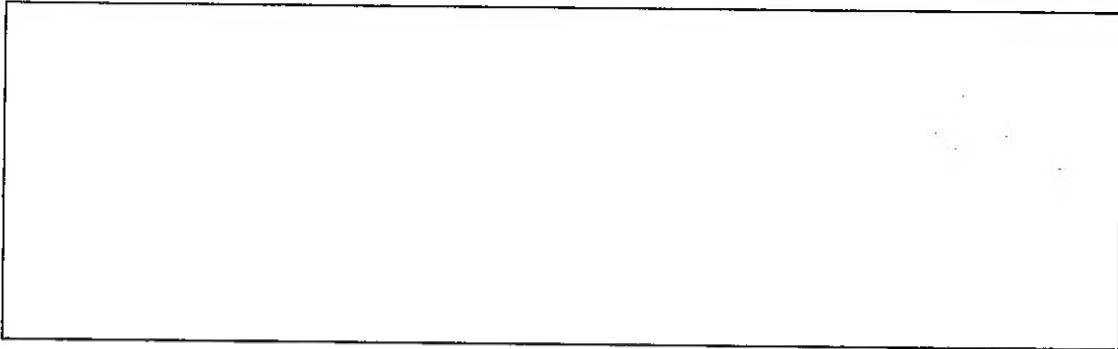
- f. State the major difference between **guided media** and **unguided media** and give two examples each. (2 marks)



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QUESTION 2:

- a. List **FOUR** services provided by the **data-link** layer of TCP/IP Protocol.
(2 marks)

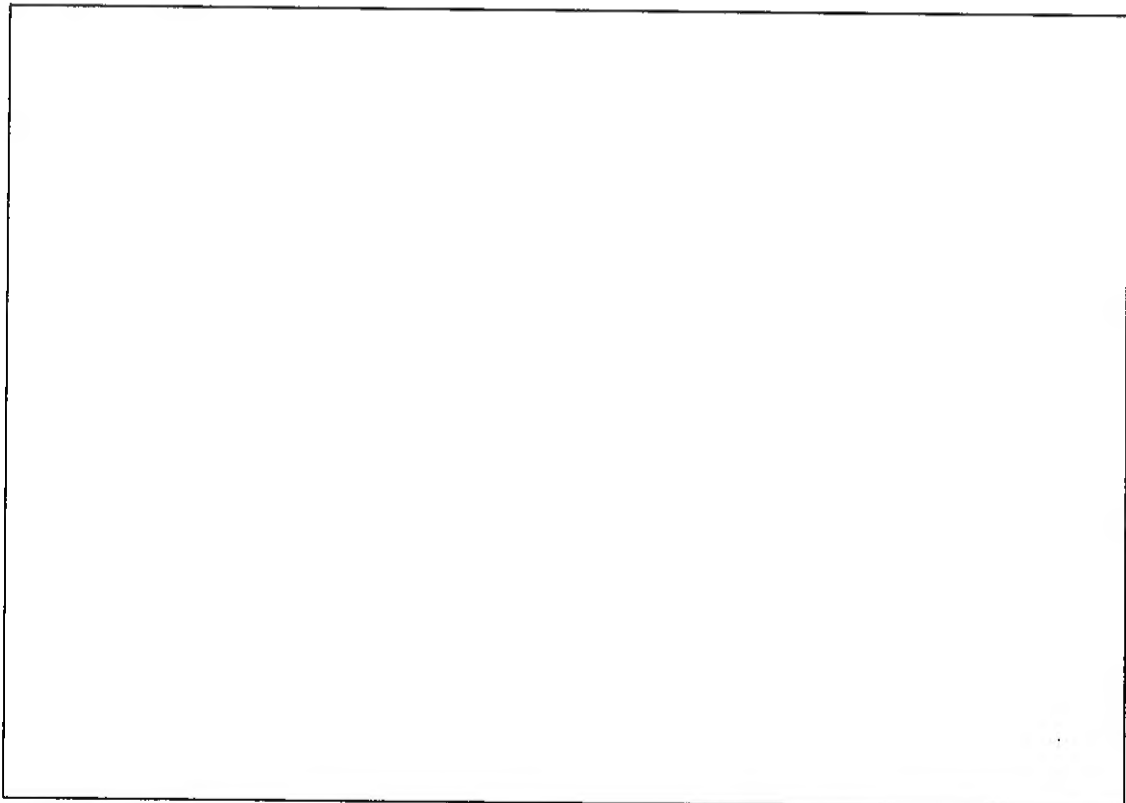


- b. Assume **Two-dimensional even parity check code** is used for error detection. Identify the data and parity bits that will be sent to the receiving end.

Original data bits are given as follows:

1011010 1101111 0101010 1111000

(3 marks)



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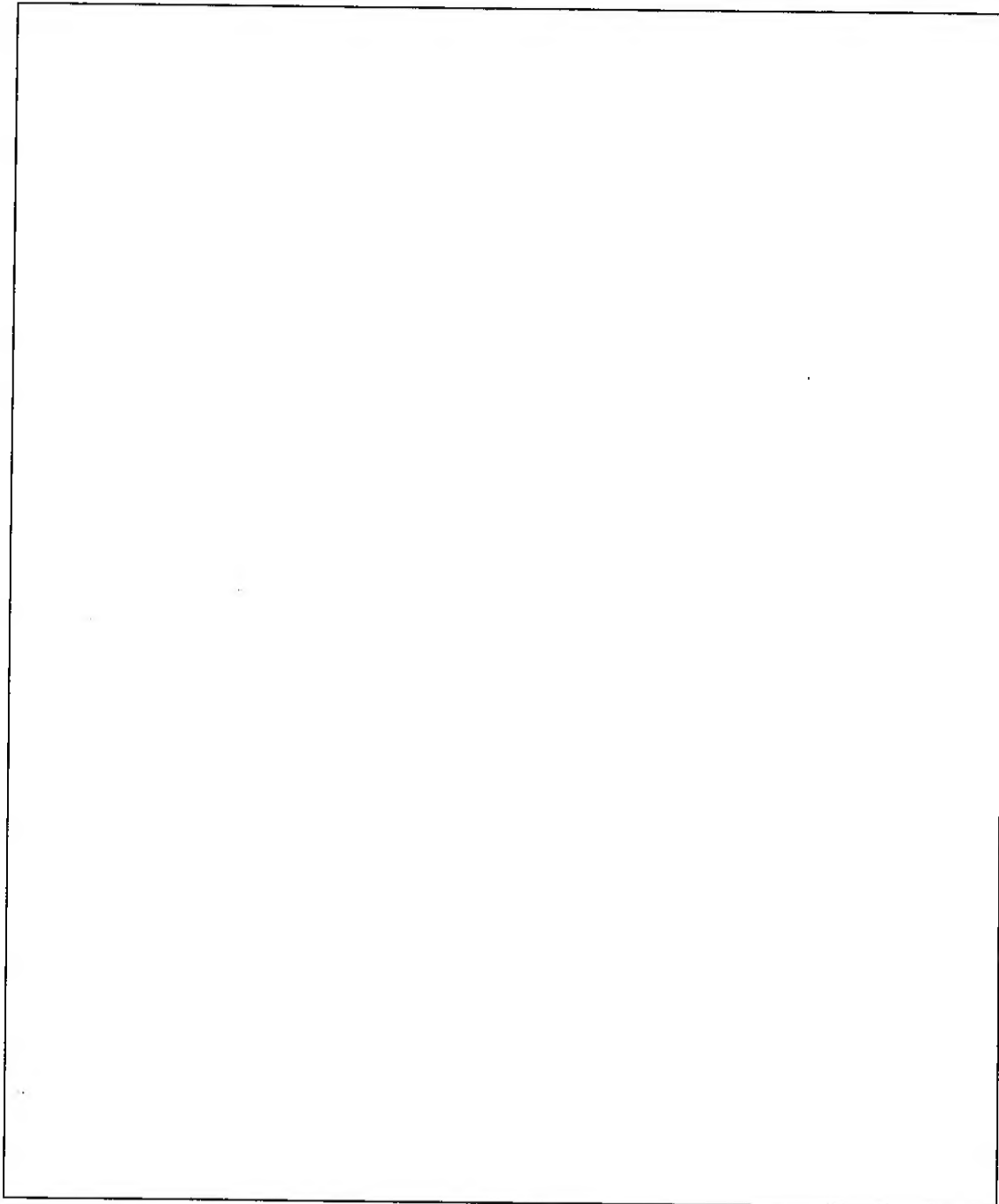
- c. Given the dataword, 10110111, and the divisor, 1101, answer the following with respect to **Cyclic Redundancy Check (CRC) code**:
Identify the Check Bits (Remainder) and the Code Word that will be generated at the sender site.
(3 marks)

Continued...

- d. Destination Ethernet address can be **unicast, multicast or broadcast**. Identify the type for each of the following destination ethernet address, with explanation.

- (i) 36:46:9B:30:20:1F
- (ii) 3F:11:96:5C:D5:7E

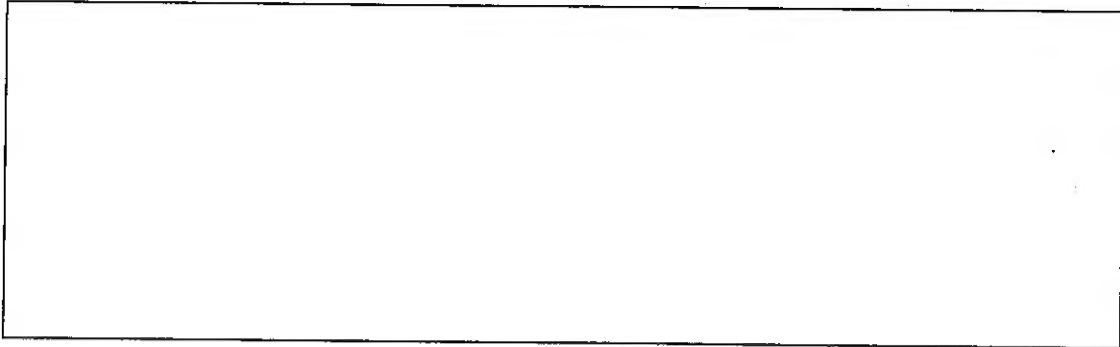
(2 marks)



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QUESTION 3:

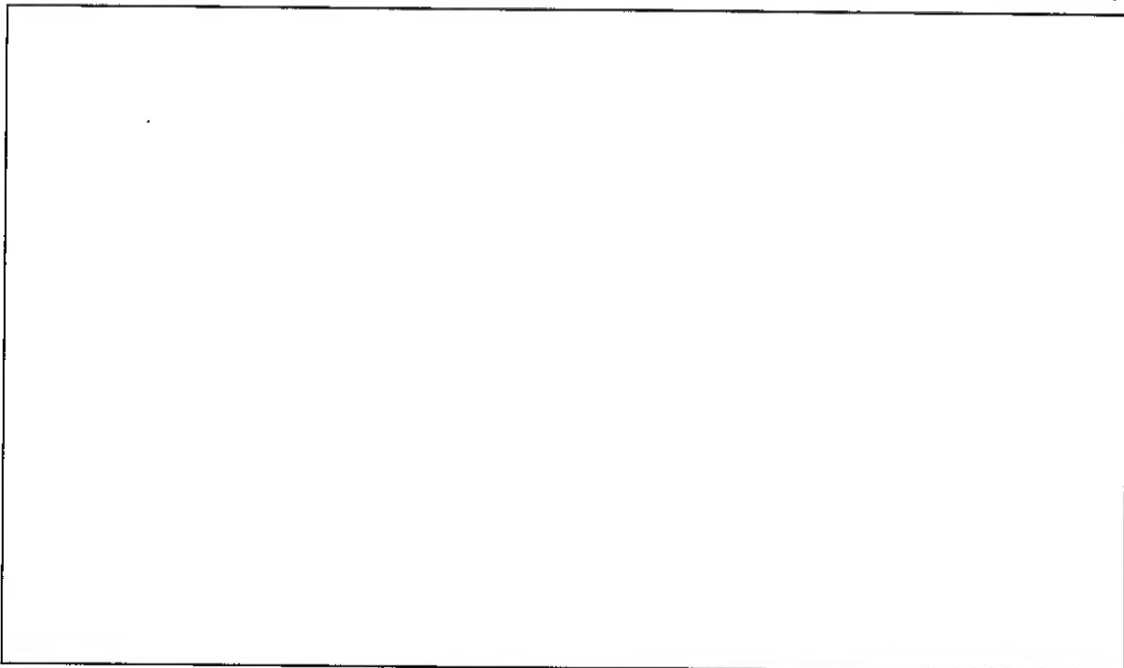
- a. State what do you mean by 'piggybacking' with respect to Stop-and-Wait ARQ protocol in the data link layer? State its **advantage**. **(2 marks)**



- b. For Carrier Sense Multiple Access with Collision Detection (CSMA/CD) to detect collisions, the frame transmission time (T_F) must be at least two times the maximum propagation time (T_P).

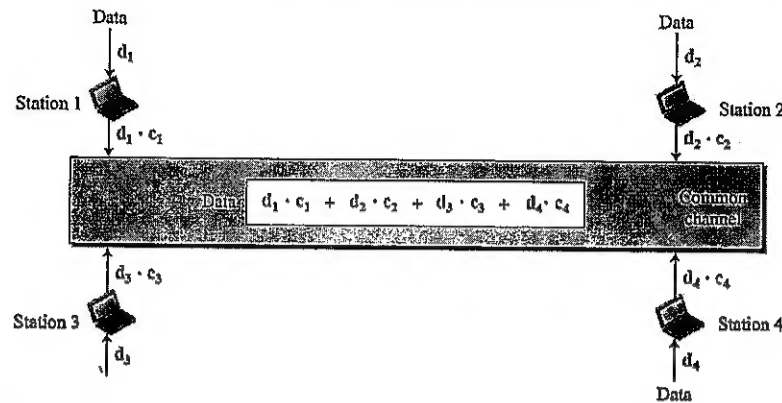
Assume that a network is using CSMA/CD and it has a bandwidth of 1 Mbps. If the maximum propagation time (T_P) is 1 millisecond, identify the

- (i) **Minimum Frame Transmission Time (in seconds)** and
(ii) **Minimum size of the frame required (in bytes)** to detect collisions. **(2 marks)**



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- c. Assume the usage of **Code-division multiple access (CDMA)** protocol to share the available bandwidth among different stations. Assume that there are four stations that are connected to the same channel as shown below.



Assume the Chip Sequences and Data sent by each station is as below.

Station	Chip Sequence (c)	Data sent	Encoded Data (d)
1	[+1 +1 +1 +1]	1	+1
2	[+1 -1 +1 -1]	0	-1
3	[+1 +1 -1 -1]	1	+1
4	[+1 -1 -1 +1]	No signal (idle)	0

Answer the following:

- Identify the total data in the channel (1 mark)
- Station 2 knows the total data on the channel and the chip sequence for station 3. Show how station 2 can get the data from station 3. (2 marks)

Continued...

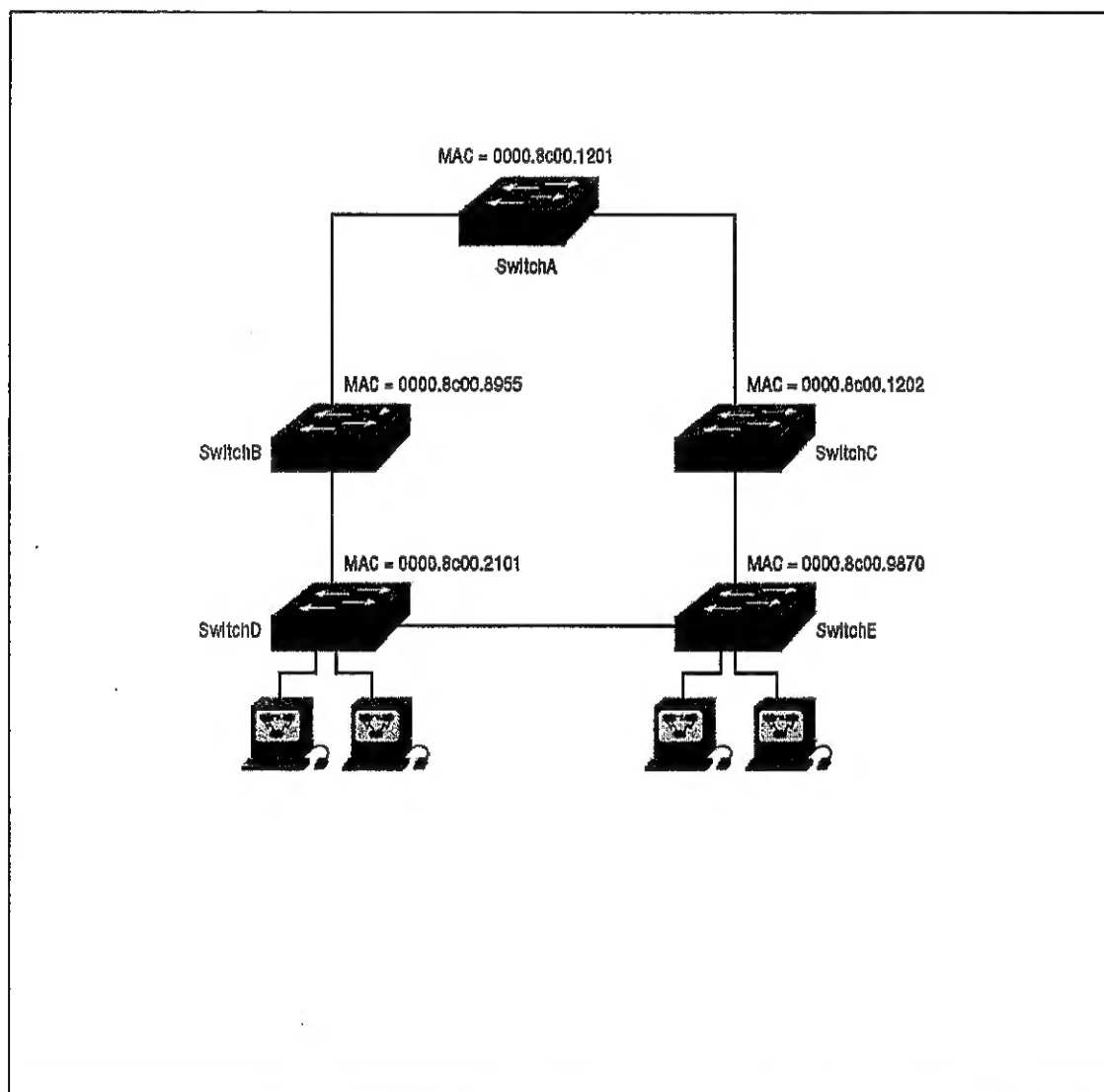
- d. Assume the usage of **Spanning Tree Protocol** to construct a loop free shortest path network and eliminate problems associated with redundant topology.

Identify the following in the switched network given below and mark them in the diagram:

- (i) Root Bridge/Switch
- (ii) Root Ports
- (iii) Designated Ports
- (iv) Non-Designated ports (Blocked Ports)

Assume all links (1Gbps) have equal path cost of 4 and all switches have default priority of 32,768.

(3 marks)



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QUESTION 4:

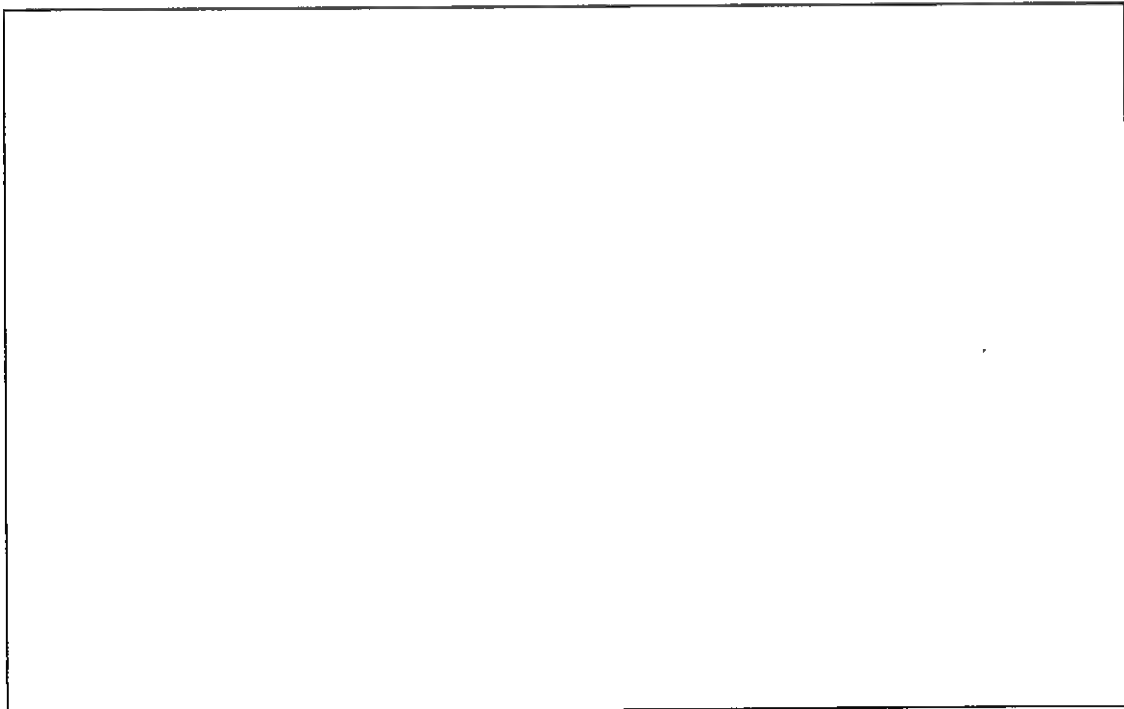
- a. An organization is granted a block of addresses with the starting address **33.44.55.0/25**. The organization needs to have 2 sub-blocks of addresses to use in its two subnets, one sub-block of **50 addresses** and another sub-block of **15 addresses**.

Assume that Classless IPv4 addressing scheme is used with the following regulations.

- VLSM (Variable Length Subnet Mask) is used for reducing IP address wastage.
- Size of subnet should closely matches with the requirements.
- Addresses for sub-block of 50 addresses have to be allocated first followed by the sub-block of 15 addresses.
- Addresses have to be allocated from the given starting address for the organization and addresses within the sub-block must be contiguous.

Answer the following.

- Identify the last address and total number of addresses in the organization. **(1 mark)**
- Identify the total number of addresses allocated, subnet mask, first address, and last address in the sub-block of 50 addresses. **(2 marks)**
- Identify the total number of addresses allocated, subnet mask, first address, and last address in the sub-block of 15 addresses. **(2 marks)**
- Identify the total number of addresses reserved (unallocated), first address and last address in the reserved space. **(1 mark)**

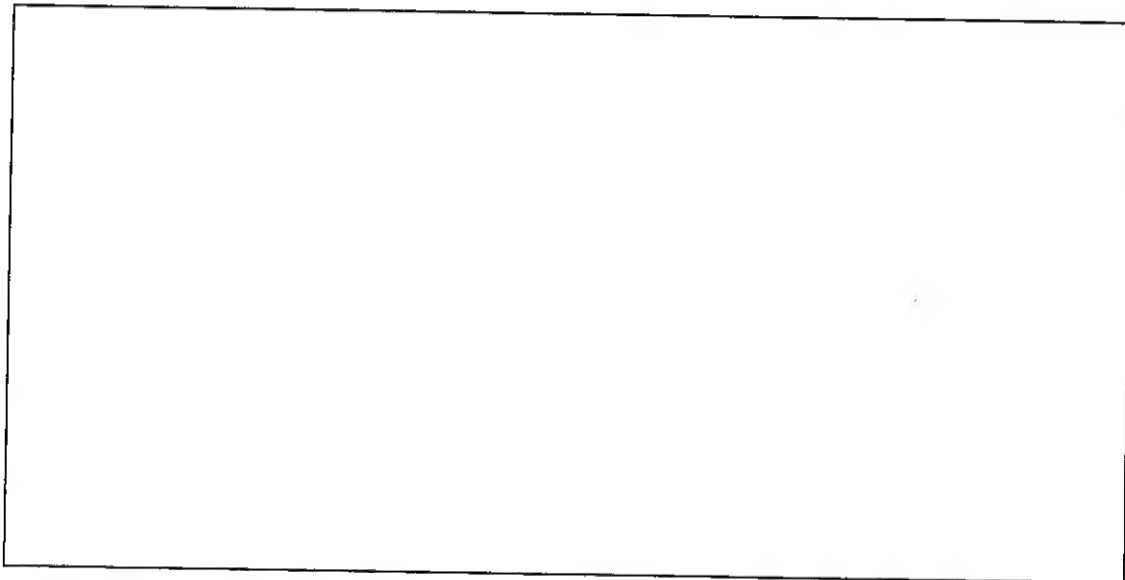


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- b. Assume the hosts and routers use classless IPv4 addressing scheme. Routing Table for Router R1 in a configuration is given below.

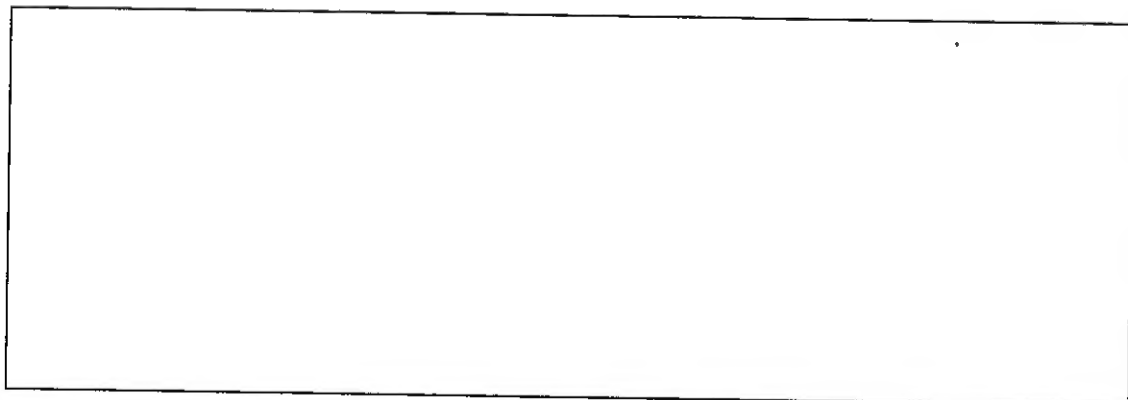
Mask	Network Address	Next Hop	Interface
/28	100.50.35.200	-	m1
/26	100.50.35.128	-	m0
/24	200.50.35.100	-	m2
Any	Any	100.50.35.230	m1

Show the steps involved in forwarding process if a packet arrives at Router R1 with the destination address 100.50.35.130 (2 marks)



- c. Decompress the following abbreviated IPv6 addresses. (2 marks)

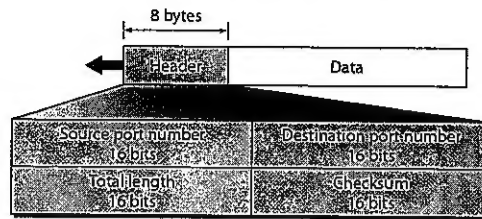
- (i) D:A:D::367E:CD6
(ii) ::36



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QUESTION 5:

- a. User Datagram packet (UDP) format is given below.



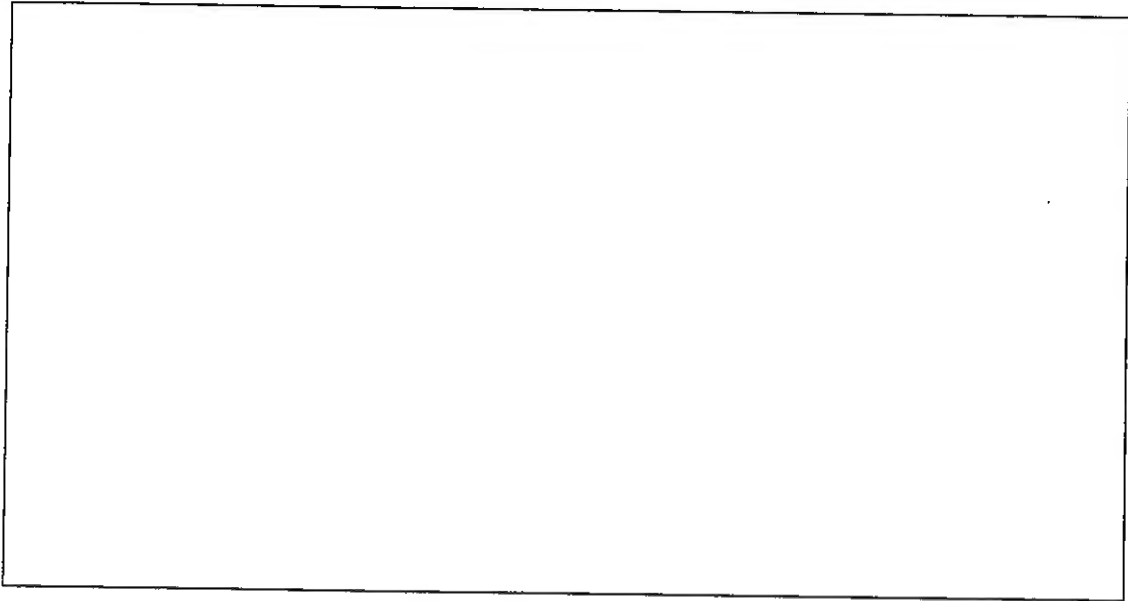
The content of a UDP header in hexadecimal format is given as
0069 00F5 001C 9356

- Identify the source port number in decimal
- Identify the destination port number in decimal
- Identify the total length of the user datagram in bytes.
- Calculate the length of the data field in bytes.

(2 marks)

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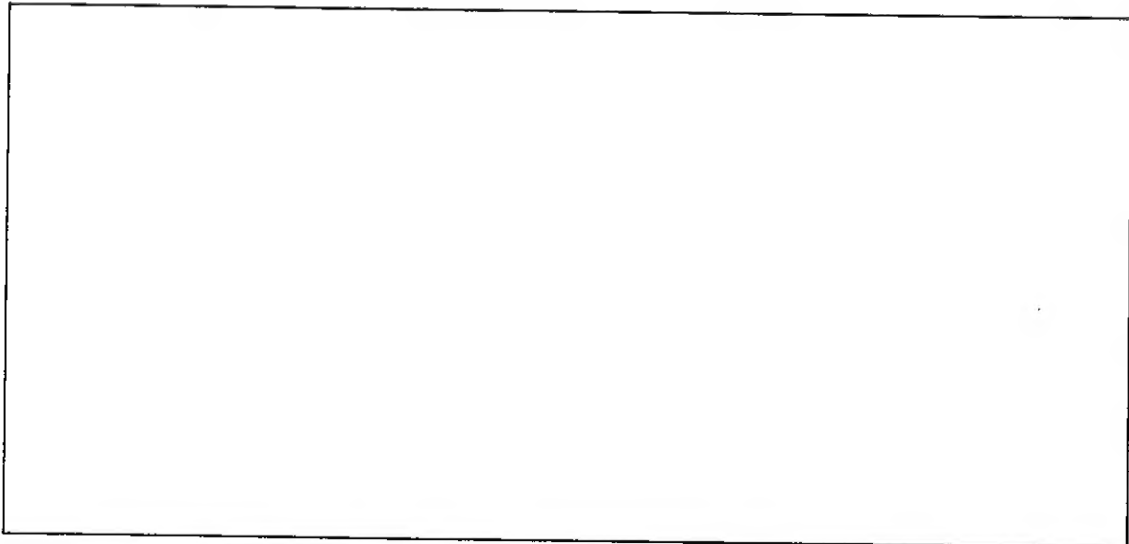
- b. Several Scheduling techniques are designed to improve the quality of service. Briefly discuss on the Weighted Fair Queuing Scheduling method of processing packets. **(2 marks)**



- c. In Simple Mail Transfer Protocol (SMTP), a non-ASCII message of 1500bytes is encoded using base 64 method where data is first divided into 6-bit chunks and converted into an ASCII character of eight bits.

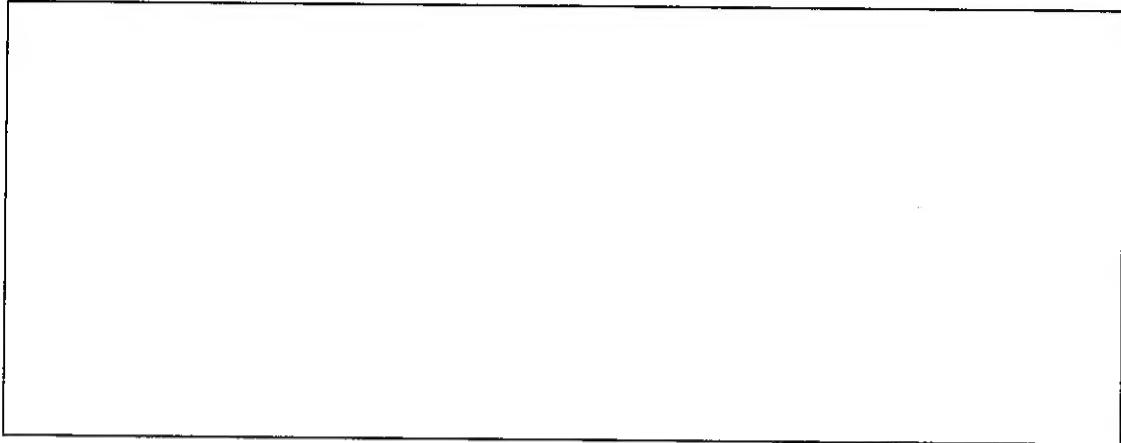
- (i) Identify the number of bytes in the encoded message
- (ii) Identify the number of bytes that are redundant.
- (iii) Identify the ratio of redundant bytes to the total message.

(2 marks)

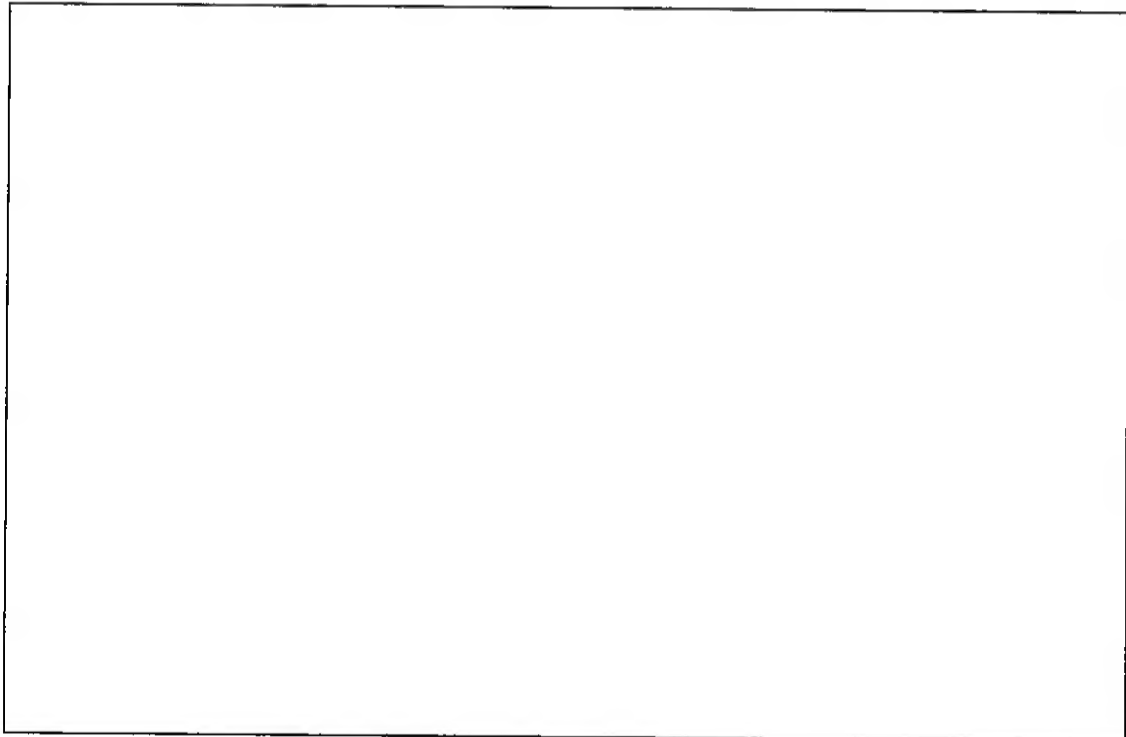


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- d. Network management can be defined as monitoring, testing, configuring, and troubleshooting network components to meet a set of requirements defined by an organization. List any **FOUR** areas of network management defined by the International Organization for Standardization (ISO). **(2 marks)**



- e. IP Security (IPSec) is a collection of protocols designed by Internet Engineering Task Force (IETF) to provide security for a packet at the network level. State the major difference between the **transport mode** and **tunnel mode** of operation for **IPSec**. **(2 marks)**



END OF EXAM